CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512

**DATE:** **June 20, 2005**

**TO:** **Interested Parties**

**FROM**: **Marc Pryor, Compliance Project Manager**

**SUBJECT**: **Calpine King City Cogen Project (85-AFC-5C)**
**Public Review of Staff Analysis for Modifications to Air Emission Monitoring Requirements**

On April 25, 2005, the California Energy Commission received a petition from Calpine King City Cogen, LLC to amend the Energy Commission Decision for the King City Cogen Project.

Calpine's King City Cogen Project is a nominal 130-megawatt natural gas-fired power plant located in the County of Monterey. The power plant has been in commercial operation since 1989 and was formerly known as the Basic American Foods (BAF) American 1 Cogeneration Project (American 1). Calpine Corporation purchased the power plant in 1996.

Calpine King City Cogen, LLC (Calpine) requests that some minor wording changes occur to their Conditions of Certification and to the Monterey Bay Unified Air Pollution Control District (District) Permit to Operate and Title V Operating Permit. Those changes include adding averaging times to permitted emission concentration levels, modifying the method to determine ammonia slip emissions from the stack, and the time requirements for submitting the results of compliance source test reports.

Energy Commission staff reviewed the petition and assessed the impacts of this proposal on air quality, and proposes revised conditions of certification to the technical areas of Air Quality. Staff's analysis is enclosed, and it is staff's opinion that, with the implementation of the new conditions, the project will remain in compliance with applicable laws, ordinances, regulations, and standards and that the proposed modifications will not result in a significant adverse direct or cumulative impact to the environment (Title 20, California Code of Regulations, Section 1769).

The amendment petition has been posted on the Energy Commission's webpage at www.energy.ca.gov/sitingcases. Staff's analysis and the order (if the amendment is approved) will also be posted on the webpage. Energy Commission staff intends to recommend approval of the petition at the July 13, 2005 Business Meeting of the

Energy Commission. If you have comments on this proposed modification, please submit them to me at the address below prior to June 12, 2005:

Marc Pryor
Compliance Project Manager
California Energy Commission
1516 9th Street, MS 2000
Sacramento, CA 95814

Comments may be submitted by fax to (916) 654-3882, or by e-mail to mpryor@energy.state.ca.us. If you have any questions, please contact Marc Pryor, Compliance Project Manager, at (916) 653-0159.

Enclosure: Air Quality Staff Analysis

Mail List: #766

**Calpine King City Cogeneration Project (85-AFC-5C)**
**Petition to Modify Air Emission Monitoring Requirements**
**Air Quality Staff Analysis**
**Prepared by Keith Golden**
**June 20, 2005**

AMENDMENT REQUEST

Laws, Ordinances, Regulations and Standards (LORS)

The only applicable regulations that would pertain to this amendment would be the administrative requirements of District Regulations 200 and 217, that requires the District to review any necessary changes to the air permits and re-issue the Permit to Operate and the Title V Operating Permit.

ANALYSIS

The applicant has requested that averaging times be added to the permitted concentration levels for such pollutants like NOx and CO which are routinely monitored with a continuous emission monitoring system. An averaging time requirement is standard practice in permit preparation and thus the staff and the District agree that adding this requirement, and the averaging times proposed, are appropriate.

The applicant requested that the method of monitoring ammonia slip be changed from the ratio of ammonia injection to the SCR grid and outlet NOx to a concentration calculation method using the inlet ammonia injection concentration and the inlet NOx concentration upstream of the SCR and the outlet NOx out of the stack to calculate an ammonia slip concentration. The accuracy of this method of ammonia slip calculation will be verified at the annual ammonia source test. This method of ammonia slip concentration is consistent with other SCR equipped power projects, specifically in the Bay Area, and thus staff would recommend this change in method.

Finally, the applicant is requesting that the time allowed to prepare the annual source test reports be extended from 30 to 60 days. Staff does not object to this additional time to prepare these reports.

The District also added some clarifying language in reference to how hydrocarbons (Volatile Organic Compounds vs. Non-methane Hydrocarbons) are characterized and to Condition 1-53 to further clarify what equipment is included in the quarterly emission limits.

CONCLUSIONS AND RECOMMENDATIONS

Staff finds that the proposed changes to the following conditions are in compliance with all LORS and will not cause a significant air quality impact. Staff therefore recommends approval to the Commission of the permit changes reflected in the District's March 14, 2005 Preliminary Decision of Proposed Permit Modifications.

PROPOSED REVISED CONDITIONS OF CERTIFICATION

The following list of conditions are those that are proposed for revision. Some of the revised language has been modified by the District from the applicant's proposed amendment language. Recommended additions are shown in **bold, double underlined text**, whereas recommended deletions are shown in ~~strikeout text~~.

Condition of Certification 6: Emissions of carbon monoxide in the turbine exhaust discharge to the atmosphere shall not exceed 10 ppmv calculated **as a three hour rolling clock average** at 15 percent O2, dry.

Condition of Certification 11. DOC Condition 2: While firing on natural gas the emissions of oxides of nitrogen, as NO2, in the turbine exhaust discharged to the atmosphere shall not exceed 9 ppmvd, calculated **as a clock hour average** at 15 percent O2 dry.

Condition of Certification 12. DOC Condition 3: Emissions of ammonia in the turbine exhaust discharged to the atmosphere shall not exceed 10 ppmv calculated **as a three hour rolling clock average** at 15 percent $O_2$, dry.

Condition of Certification 15. DOC Condition 6: While firing on No.2 fuel oil the emissions of oxides of nitrogen, as $NO_2$, in the turbine exhaust discharged to the atmosphere shall not exceed 15 ppmvd, calculated **as a clock hour average** at 15 percent $O_2$ dry.

Condition of Certification 29. DOC Condition 20: ~~A continuous monitoring system must be installed and operated to monitor and record the mole ratio of injected ammonia to gas turbine outlet (HRSG) NOx. This system must be accurate to within +/- 5 percent.~~ **The ammonia emissions shall be monitored by the using the following ammonia slip calculation:**

**NH3 slip (ppmvd @15% O2) = ((NH3 fed ppm – (NOx in ppm – NOx out ppm)) * ((20.9 – 15)/(20.9-O2)))/* b**

**Where:**

**NH3 fed in ppm = ((NH3 injection rate, lb/hr * a)/(Q*Fd*4.4096E-8))**
**((20.9 – O2%)/20.9))**

**4.4096E-8 = (K-factor constant) corrects for the molecular weight of ammonia**
**a = Ammonia Concentration (in % by weight/100)**
**b = Correction Factor based on source test data**
**Q = Fuel Flow mmbtu/hr**
**Fd = 8710 scf/mmbtu**

Condition of Certification 34. DOC Condition 25: ~~Within 60 days after achieving the maximum turbine operating conditions, but not later than 180 days after initial start-up, performance tests shall be conducted~~ **An annual compliance test shall be conducted**

**prior to January 1 of each year** in accordance with the MBUAPCD test procedutes, and the written results of the compliance test shall be provided to the District within ~~30~~ **sixty** days after testing.

f. ~~Non-methane hydrocarbon~~ **Volatile Organic Compounds:** ppm and lb/hr.

**Verification:** The project owner shall submit for approval a performance test protocol to the MBUAPCD and CEC staff 30 days before beginning testing of the gas turbine. The project owner shall submit to the MBUAPD and CEC staff a written report on the results of such performance tests within ~~30~~ **sixty** days after testing.

Condition of Certification 36. DOC Condition 27. The project owner shall conduct quarterly tests in the first year, and on an ~~semi-~~annual basis to determine turbine stack discharge ammonia emissions. Tests shall be conducted in accordance with MBUAPCD test procedures and the District shall be notified at least 7 days prior to testing. The test results shall be submitted to the District within ~~thirty~~**sixty** days after testing.

1-53. ~~The total quarterly and annual emissions from operation of all fuel fired equipment at this source shall not exceed the following limits while firing natural gas:~~ **Cumulative emissions, including emissions generated during Start-ups and Shutdown, from all equipment at Calpine King City Cogen, LLC and the Gilroy Energy Center, LLC shall not exceed the following quarterly and annual limits:**

| | NOx (lb.) | CO (lb.) | PM10 (lb.) | VOC (lb.) | SO2 (lb.) |
|---|---|---|---|---|---|
| **1st Quarter** | 72,452 | 58,445 | 12,071 | 4,762 | 1,748 |
| **2nd Quarter** | 73,178 | 59,095 | 12,204 | 4,815 | 1,768 |
| **3rd Quarter** | 73,905 | 59,744 | 12,339 | 4,868 | 1,787 |
| **4th Quarter** | 73,905 | 59,744 | 12,339 | 4,868 | 1,787 |
| **Annual** | 293,440 | 237,028 | 48,953 | 19,313 | 7,090 |

**Note: During periods of oil firing as allowed for on the permits for the Frame 7 Turbine and the Boilers, the allowable emissions are increased by the incremental hourly limit for oil firing versus the natural gas hourly limit for all hours the equipment was actually operated on fuel oil.**

REFERENCES

(Calpine 2004). Petition to Amend Commission Decision Conditions of Certfication. November 11, 2004.

(MBUAPCD 2005). Monterey Bay Unified Air Pollution Control District. Evaluation Report, Preliminary Decision on Proposed Permit to Operate for King City Energy Center, LLC. Mach 14, 2005.